

THE BACILLUS CARRIER AND THE RESTAURANT.

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ONE of the noteworthy manifestations of modern industrial expansion is a marked division of labor and a progressive development of occupational specialization, and the inevitable outcome of this movement is an ever-increasing concentration of individuals within restricted areas. The health problems arising from the rapid increase of urban populations are of such magnitude and complexity that public opinion will eventually demand an installation of thoroughly trained experts to cope with them.

Prominent among these problems is that of the public and semi-public restaurant. Economic and domestic conditions have forced large numbers of city dwellers to obtain one or several meals per diem from restaurants and delicatessen; these public eating places are gradually displacing the time-honored system of home-cooking. Undoubtedly there are advantages and disadvantages in this change; from the viewpoint of public health there is cogent danger in an uncontrolled development of this character. The public restaurant is a potential factor in the spread of certain types of disease because foods from many sources, manipulated by many hands, are dispensed to many patrons.

The occasional dissemination of disease through food is well established; infected shellfish, milk, meat and vegetables have been shown to transmit

typhoid bacilli and the viruses of other excrementitious diseases, botulism, and that large and somewhat poorly defined group of gastro-intestinal disturbances commonly classed as food poisoning to susceptible individuals who partake of them. These diseases can be transmitted through food without the mediation of the restaurant, and the chief importance of the latter in this association is to provide a distributing point for infected food. Fortunately the efficiency of national, state and municipal food inspection reduces the danger of infection from raw food stuffs to a minimum. On the other hand, the rapid increase in the personnel of the catering industry automatically increases the danger of infection of food prepared and handled in the restaurant, for it is obvious that the greater the number of individuals engaged in manipulating the food of the public the greater are the chances that bacillus carriers will be drawn into the public culinary service. A bacillus carrier engaged in preparing or serving food for a multitude is a greater menace to the public health than would be the case if these same activities were exercised in but a single family. The association of infection with a carrier is usually evident in the home, but for obvious reasons it is frequently difficult to establish in the restaurant. Judging from available evidence, the

restaurant does not appear to be a potent factor in the spread of disease, but a potential danger exists, as the following actual experience clearly shows:

Seventeen cases of typhoid fever developed among the five thousand employees of a large departmental store within two weeks. There was little typhoid in the city at the time—rather less than usual—and the cases were so widely distributed among different departments that no single intramural factor could be advanced to explain this sudden outbreak. A thorough examination of the entire plant failed to reveal a plausible source of infection. All of the patients were accustomed to eat their midday meal in a nearby lunchroom. An investigation of this lunchroom revealed the very significant fact that several cases of typhoid fever had developed among the employees; a waitress recently convalescent from typhoid was the probable source of infection. This view was sustained by a prompt cessation of new cases when the lunchroom was closed.

The departmental store in question maintains a restaurant department which requires about two hundred and twenty-five employees—cooks, waitresses and scullions—for its operation. It was probable, but not absolutely certain, that none of the restaurant employees had eaten in the lunchroom; if they had eaten there they had been definitely exposed to infection. The infection might develop as a mild ambulatory case of typhoid fever, or the bacillus carrier state, either of which would be serious because an unrecognized ambulatory case, or a

bacillus carrier working in the restaurant might transmit the disease to a large number before the condition was realized.

The most pressing and immediate problem obviously was to formulate a plan, simple in procedure and efficient in operation, which could be utilized at once to eliminate the possibility of infection of employees or patrons of the restaurant, pending an individual search among the former for incipient and ambulatory cases of typhoid, and for carriers. These measures were to be supplemented by a rigorous examination of all new employees prior to their admission to the restaurant staff.

The portal of entry of the typhoid bacillus is the mouth, to which it may be carried directly by infected fingers, and less directly in infected food, milk, or water. This explains the relation of the restaurant to the spread of typhoid.

The typhoid bacillus leaves the body of the typhoid patient and the typhoid bacillus carrier in the feces, and less commonly in the urine. The hands of a typhoid carrier are exposed to direct infection from the feces or urine one or several times daily and it requires little imagination to follow the organisms from the infected and imperfectly cleansed fingers of a cook or waitress to the mouth of the prospective victim. It would appear, therefore, that bacterially clean hands would be an extremely important factor to insist upon among the employees of a restaurant.

The plan adopted consisted first of an explanation in simple terms to the

employees of the possibility and mode of infection, and the efficiency of soap and the thorough scrubbing of the hands, with the necessary demonstrations; then the enforcement of hand cleansing under the supervision of a nurse of strong personality. Each employee was required to "scrub up" before entering the space set apart for the restaurant, in the morning, after the noon recess, and after an absence during the day. The entrance to the restaurant department happened to be so arranged that this plan was feasible.

Efficiency of the Method.—The success or failure of scrubbing the hands depends obviously upon the sterility of the brush and the washing water, that is, their freedom from typhoid bacilli and similar organisms, the thoroughness of the individual effort, and the efficiency of the supervision. The sterility of the brush and the water, that is to say, the absence of pathogenic bacteria, can be practically insured by keeping the former in a disinfecting solution and using water of known purity. The water supply of the store under discussion was filtered and known to be free from colon bacilli and similar organisms; the soap used was one containing a moderate amount of a phenol derivative.

The bacterial efficiency of the scrubbing process is indicated by the following experiment: A series of seventy-two fruit jars, each containing a small amount of absorbent cotton and 200 cc. of water, was sterilized in the usual manner. Each of seventy-two employees was required to wash his hands with the cotton, rubbing it thoroughly under each finger-nail, and

then to replace the cotton in the jar, which was sealed and numbered. Sixty of the seventy-two had previously scrubbed their hands under supervision; twelve washed their hands without the preliminary scrubbing. The jars were sent to the laboratory and examined for *Bacillus coli*, it being assumed that the absence of this organism would be a strong indication of the practical success of the cleansing process.

The cotton was squeezed approximately dry with sterile forceps, and 0.1 cc. and 1 cc. respectively of the water from each jar was planted in lactose broth in the usual manner. After forty-eight hours' incubation the water in which each of the twelve unscrubbed individuals had washed his hands showed *Bacillus coli* in 0.1 cc. The samples of water obtained from the employees who had scrubbed their hands prior to the experiment showed no colon bacilli even in 1 cc. This experiment, carried out under strict supervision, was deemed sufficiently conclusive to warrant a tentative assumption that the danger from infection by an unrecognized bacillus carrier was reduced to a minimum. Of course, the measure did not influence the possibility of infection through milk or other food-stuffs contaminated outside the store, and it does not take cognizance of respiratory diseases spread by droplet infection.

Attention was now directed to an examination of the two hundred and twenty-five employees comprising the restaurant personnel for typhoid carriers. Two laboratory possibilities

present themselves for this purpose,—the actual isolation of the typhoid bacillus from the feces or urine, which is conclusive, and the Widal reaction. It is well established that a majority of convalescent typhoid patients give a positive Widal reaction which may persist for months or years after clinical recovery. Many typhoid bacillus carriers also have a positive Widal, hence it was deemed logical to examine the blood of each employee for the presence of agglutinins specific for *Bacillus typhosus*. The dried blood method was used. It was realized that a positive Widal reaction does not necessarily indicate a bacillus carrier—a majority of recovered cases do not become bacillus carriers; a positive reaction also may result from a prophylactic immunization with typhoid bacilli. A negative Widal reaction conversely does not necessarily exclude bacillus carriers, incipient infections or ambulatory cases, because agglutinins specific for the typhoid bacillus do not appear in every convalescent case, nor do they appear regularly during the first week of the clinical disease. Four positive reactions were found among the two hundred and twenty-five employees, but repeated examinations of their feces and urine were negative for typhoid bacilli. It is probable they were not carriers.

The final proof of a bacillus carrier, as stated above, rests upon a demonstration of typhoid bacilli in the feces or urine. An examination of urine for typhoid bacilli is relatively simple. Upon Endo plates the typhoid bacilli grow readily and in relatively pure culture as a rule. The urine samples of

all of the employees were negative for typhoid bacilli; many, however, showed colon bacilli, due largely to the necessarily imperfect method of collecting the samples. Seventy-six samples of feces were examined for typhoid bacilli, all of them being negative. This latter method was abandoned, partly because of the difficulty in getting feces, partly because the subsequent control of the hand-scrubbing method showed that it retained its efficiency. One bacillus carrier was detected—a cook convalescent from illness of several weeks' duration reported for duty. The urine, feces and blood were submitted for examination. The Widal reaction was positive and typhoid bacilli were found in the feces, but not in the urine. The individual was informed of his condition and was not admitted to the restaurant staff.

This investigation together with a conference with the administrative and executive officers of the store led to the establishment of a policy along the lines indicated above, which was to be rigorously maintained. A survey of the sources of milk and various foods brought to the store indicated that the sources of supply were as safe as it is possible to obtain them commercially.

Supervision of manual cleanliness maintained along the lines indicated above, with the coöperation of the management, the nurse and the employees should reduce the potential dangers of bacillus carriers to a minimum, and the relatively slight cost of the protection afforded is more than compensated for by the feeling of relative security both from the viewpoint of the store and of the patrons.